

- I. Pig iron is made in a blast furnace by smelting iron ore with coke and limestone.
 - A. In general it has around 95 percent FE content, plus certain impurities such as carbon (say, 4 percent), and silicon, manganese, phosphorous and sulfur.
 - B. The product of the small, local furnaces in China may well contain organic matter as well.
 1. These furnaces produce a non-uniform product: from 300,000 furnaces, you will get 300,000 analyses.
- II. Cast iron is made by melting pig iron with coke in a cupola furnace to remove sulfur.
 - A. It can be poured directly into molds but product is brittle, and lacking in tensile strength.
 - B. The quality of the castings in China's "leap" depends directly on the quality of the pig iron used.
 1. In general it is heavy in relation to its strength and can't be used where great stress is anticipated.
 2. It can be used for pipe, engine blocks, bed plates, etc.
- III. Wrought iron is made by placing pig iron and a good quality iron ore in a puddling furnace.
 - A. The ore contains oxygen which combines with the silicon and manganese to form a slag which in turn absorbs the phosphorous.
 - B. While slag still molten, mixture is stirred thus removing some carbon.
 - C. Result is a fairly pure refined iron, with an admixture of slag.
 1. Slag is mostly iron silicate which lends tensile strength, and anti-corrosive properties.

D. This is one of the most likely ways that China's local-made pig iron will be used--made into bars, belts, plates, etc.

IV. Steel is a mixture or an alloy of iron having $\frac{1}{4}$ of 1 percent to $2\frac{1}{2}$ percent carbon content. (Most steels in low carbon range of 0.3 percent-0.6 percent.)

A. Carbon content determines the characteristics of the steel--usually the higher the carbon content, the higher the tensile strength: if it is too high, the steel is too brittle.

1. Steel is more workable than any of the iron products and has greater strength per unit of weight.

B. Steel is made in Open Hearth furnaces, in Bessemer Converters, in electric furnaces and in crucibles.

C. Steel being produced in China at the local level is in the greater part made in Bessemer.

1. In this process the pig iron is heated in a metal shell and air is driven through the melting pig, oxidizing off carbon and some other impurities.

2. Depending on the analysis of original ore a lining can take care of additional impurities.

3. The process is controlled either by eye, which requires an experienced man, or by electronic controls.

4. China is in the process of adding Bessemer in small, local plants and to a lesser extent in back yards.

a. However, Bessemer are a more sophisticated apparatus than China's back yard ^{blast} furnaces in that they require a metal shell and a powered blower, usually run by an electric motor (hand blowers won't do).

V. Problem of analysis looms large in turning pig iron now being produced locally in China into steel.

- A. Each furnace produces its own unique product and technical personnel to analyze it are lacking.
- B. But process already beginning of amalgamating the more efficient local pig iron producers and eliminating the less efficient ones (in any case many will be ruined by winter frosts).
- C. Only a limited portion of the pig iron produced with such effort this fall will be made into steel.
 - 1. Given the vicissitudes of analyzing the pig, the steel produced will vary widely in quality.
 - 2. But most will be usable for nails, wire, and other simple applications where lower strength is acceptable.
 - 3. Peiping just beginning to talk about adding steel finishing capacity at the local level.